



Executive Summary

The Odyssey Condominium is a luxury mid-rise residential building located in Arlington, Virginia. The building features a 16 story tower with glass curtain walls and brick veneer containing condominium units on the upper levels. A two-way post-tension flat plate was designed throughout the tower structure in order to limit overall building height under code restrictions. The system provides a minimum structural thickness of the flat plate design over large spans and reduces floor-to-floor heights of the tower structure.

This report is an investigation of a redesign of the floor system for the residential levels of the Odyssey. A structural redesign of the flat plate system will provide a better understanding of the design implications of incorporating an alternative system into the residential design scheme of a two-way post-tensioned flat plate design. Design considerations include maintaining the integrity of residential spaces and limiting overall building height. The lateral system is also a consideration for the redesign with loads developed from ASCE 7-02. A cost analysis and schedule for construction of a typical floor will focus on the difference in the structural design of the proposed system for comparison with the post-tensioned design.

The proposed floor system is a conventionally reinforced two-way flat plate. The system met design criteria of maintaining the existing ceiling heights without exceeding building height limitations. The effective structural depth of the system increased as a result of designing with conventional reinforcement. Column sizes increased slightly with a modification of concrete strengths to maintain a uniform column size throughout the entire building. The proposed flat plate system increased overall building weight resulting in a design adjustment to the proposed shear wall system. The flat plate was incorporated into the lateral design with an addition of 6 levels to the central shear walls. Structural cost of the proposed system was higher per square foot with a majority of the cost difference from additional reinforcement in the flat plate. The average duration per floor for the proposed system was shortened without the added construction time of placing and jacking post-tensioned tendons. Although the proposed system met design criteria, the overall structural design and cost implications are more feasible with a two-way post-tensioned flat plate design in the residential levels of the Odyssey.